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EXAMINER	
HAJNIK, DANIEL F	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/532,904	**Applicant(s)** REDERT ET AL.	
	Examiner DANIEL F. HAJNIK	**Art Unit** 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 7-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 7-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 7-10 and 18-21 rejected under 35 U.S.C. 103(a) as being unpatentable over Gelsey (US Pat. No. 6,344,837). in view of Moseley et al. (US Patent 5,953,148).

Regarding Claim 1.

Gelsey discloses a method for visualization of a 3-dimensional (3-D) image, the method comprising acts of:

converting a 3-D scene model into a plurality of 3-D scene points;

(See e.g. col. 9 lines 4-5) into a plurality of 3-D scene points *(See e.g. col. 9 lines 4-10 where the 3-D scene point is the point where R intercepts S. See also e.g. Figs 1, 2 and 3);*

providing at least a portion of the plurality of 3-D scene points to a 3-D display plane comprising 3-D pixels that are directionally modulated *(See e.g. col. 9 lines 25-29, where SP = scene point, and DMP = 3-D pixel);*

calculating the 3-D pixels a contribution of light *(col 8, lines 26-36 and in figure 13) from the 3-D pixel to generate at least in part a scene point of the plurality of 3-D scene points (in*

figure 7 where the cube is a directionally modulated pixel or 3-D pixel; in this figure, the point source of light is 15; a scene point is shown in figure 8 for objects 4, 6, and 8; a scene point is any individual point representing part of the object surface or definition as shown; in figure 8, a plurality of directionally modulated pixels or 3-D pixels are located in image display device IDD 26);

performing at least one of emitting and transmitting the light by each of the 3-D pixels that is calculated to contribute to the scene point *(See e.g. Fig 3 block 10 and Fig. 4A and See e.g. Abstract, "each directionally-modulated pixel is provided by locating a point source of light behind a microminiature array of liquid crystal device (LCD) elements, each of which are operated by a control device programmed to vary the light transmission characteristics of each element at a given time ").*

Gelsey does not explicitly teach the remaining claim limitations.

Moseley teaches the claimed:

wherein the contribution of light of a 3-D pixel to a certain 3-D scene point is calculated within one 3-D pixel of a row or column prior to the provision of the 3-D scene points from the one 3-D pixel to remaining 3-D pixels of the row or column, respectively *(in figures 19 and 20 where the gate lines 40 and the source lines 39 enable one 3-D pixel, shown as diamond shaped areas in the figures, to be calculated or its light contribution to be calculated before another pixel in that same row or column is calculated, i.e. the pixels are calculated sequentially one by one across the row as an example; also see col 3, lines 13-21, "Such conductors generally comprise row conductors (normally referred to as "gate lines" in standard thin film transistor*

LCDs), which extend <u>essentially horizontally and connect all the pixels in each row, and column conductors</u> (referred to as "source lines") which extend essentially vertically and <u>interconnect the pixels</u> in each column. In matrix addressed devices, the gate and source lines <u>are addressed in sequence</u> to control the pixels so as to avoid having an individual electrode connection for each pixel").

such that one of the pixels of the row or column acts as a master pixel for the row or column, while other pixels of the row or column act as slave pixels *(in figures 19 and 20 where the gate lines 40 and the source lines 39 enable one pixel to influence a neighboring pixels in that row; also see col 3, lines 13-21 where the interconnection of pixels enables sequential addressing, thus a first pixel in the row acts as a master pixel and other pixels in that row are slave pixels).*

It would have been obvious to those having ordinary skill in the art at the time of invention to use the interconnect of the 3-D pixels of Moseley with the 3-D pixels of Gelsey in order to address pixels with less direct circuitry (col 3, lines 18-21 of Moseley). Gelsey is modified by Moseley by incorporating the interconnections of 3-D pixels, i.e. the gate lines 40 in figure 19 to the 3-D pixels used in Gelsey.

Regarding Claim 2.

Gelsey discloses the method according to claim l, wherein light is emitted and/or transmitted by 2-D pixels comprised within the 3-D pixels, each 2-D pixel directing light into a different direction contributing light to a scene point of the 3-D scene model.

(See e.g. Gelsey col. 4 line 54 through col. 5 line 8 especially "centrally located point source of light within … modulation regions" and "light emitted in different directions having the different visual properties appropriate for the scene being displayed." The claimed 2-D pixels are also shown in figure 7 as rectangular or square modulation regions 24)

Regarding Claim 3.

Gelsey does not explicitly disclose the method according to claim 1, wherein the 3-D scene points are provided sequentially, or in parallel, to the 3-D pixels.

However, Moseley teaches the use of parallel access to 3-D pixels through their source lines 39 in figures 19 and 20 where these lines can access multiple rows at once and teaches the use of sequential access to 3-D pixels through their use of gate lines 40 in figures 19 and 20 (also see col 3, lines 13-21).

It would have been obvious to those having ordinary skill in the art at the time of invention to modify the display method of Gelsey to provide 3-D scene points to 3-D pixels sequentially or in parallel as taught by Moseley because highly parallel data processing systems provide improved performance.

Regarding Claim 4.

Gelsey discloses the method according to claim 1, wherein the calculation of the contribution of light of a 3-D pixel to a certain 3-D scene point is made previous to the provision of the 3-D scene points to the 3-D pixels *(See e.g. Gelsey col. 10 lines 1-11, "However, all computations to display a given set of 3D scenes can be done in advance and stored for later*

playback". See also Fig. 14, where scene point SP is set equal to Intercept (R,S) in block 72, followed by provision of the scene points to the 3-D pixel in block 74 by setting the modulation region to match SP).

Regarding Claim 7.

Gelsey does not explicitly discloses all the claimed limitations.

The combination of Gelsey and Moseley teach the claimed: the method according to claim 1, wherein a 3-D pixel alters the co-ordinates of a 3-D scene point prior to putting out the altered 3-D scene point from the 3-D pixel to at least one neighboring 3-D pixel *(where Gelsey shows a 3-D pixel, a cubic directionally modulated pixel, in figure 7 and 3-D scene points in figure 8 where the shapes projected from screen 26 are made of a plurality of scene points; in figure 8, each 3D pixel affects the coordinates or position of the 3-D scene shapes because the 3-D pixels are located inside screen 26; Moseley shows how the output of one cell or pixel may alter data of an adjacent or neighboring cell in figures 19 and 20 through their sequential connecting of 3-D pixels. This connection between pixels, i.e. gate lines 40, which share a common row, establishes intercell communication, i.e. see col 3, lines 16-18. When the two references are combined, all the claimed features are taught).*

It would have been obvious to one of ordinary skill in the art to use the intercell communication in a row as taught by Moseley with the 3D pixel array in Gelsey in order to avoid having an individual electrode connection for each pixel (col 3, lines 20-21 of Moseley).

Regarding Claim 8.

Gelsey discloses the method according to claim 1, wherein if more than one 3-D scene point needs the contribution of light from one 3-D pixel, the depth information of the 3-D scene point is decisive *(See e.g. col. 4 lines 49-53 where occlusion depends on viewing direction.)*

Regarding Claim 9.

Gelsey discloses the method according to claim 1, wherein 2-D pixels of the 3-D display plane transmit and/or emit light only within one plane. *(See e.g. col. 6 lines 1-24, esp. 18-19, also see figure 7, where the rectangular or square modulation regions 24 emit light only within one plane as shown because the front surface of the cubic directionally modulated pixel is flat).*

Regarding Claim 10.

Gelsey discloses the method according to claim 1, wherein color is incorporated by spatial or temporal multiplexing within each 3-D pixel *(See e.g. col. 5 lines 8-24 and Fig. 5. See also col. 5 lines 55-65 where the RGB, red blue green, color components are multiplexed).*

Regarding Claim 18.

Gelsey teaches the method according to claim 1, wherein each 3-D scene point has co-ordinates x, z, y and a luminance value *(in figure 7 where the cube shown is a directionally modulated pixel with a point light source 15 that has a luminance value is controlled through modulation regions 24; these 3-D pixels produce 3-D scene points with corresponding luminance values through emitting and transmission of light; the x, y, and z coordinates are shown in figure 8 where the 3-D scene points have corresponding positions values including a*

depth component that is used to represent objects 4, 6, and 8 that appear to come out of image display device 26)

Regarding Claim 19.

The reasons and rationale for the rejection of claim 1 is incorporated herein.

Gelsey does not explicitly disclose: performing at least one of emitting and transmitting the light by each of the 3-D pixels that is calculated to contribute to the scene point, wherein a 3-D pixel alters the co-ordinates of a 3-D scene point prior to putting out the altered 3-D scene point from the 3-D pixel to at least one neighboring 3-D pixel and wherein for each 3-D pixel that receives an altered 3-D scene point, the act of calculating comprises an act of calculating the contribution of light from the 3-D pixel based on the altered 3-D scene point.

Moseley teaches the claimed: performing at least one of emitting and transmitting the light by each of the 3-D pixels that is calculated to contribute to the scene point *(in figures 2 and 4 where emitted and transmitted light is shown from the pixels in the display on the left)*, wherein a 3-D pixel alters the co-ordinates of a 3-D scene point prior to putting out the altered 3-D scene point from the 3-D pixel to at least one neighboring 3-D pixel *(in figures 19 and 20 where 3-D pixel data travels sequentially through gate lines 40 where one 3-D pixel, shown as diamond shaped areas in the figures, may alter co-ordinates for a 3-D scene point that is emitted and transmitted before it reaches an adjacent 3-D pixel along gate line 40 in the sequentially processing; data altered on the 3-D pixels in figures 19 and 20 affect the 3-D scene points produced by the pixels as shown as in figures 2 and 4)* and wherein for each 3-D pixel that receives an altered 3-D scene point, the act of calculating comprises an act of calculating the

contribution of light from the 3-D pixel based on the altered 3-D scene point *(col 3, lines 13-21 and in the sequential processing used in figures 19 and 20 through gate lines 40 which calculate contributions of light from each 3-D pixel in the figures to produce 3-D scene points as shown in figures 2 and 4).*

It would have been obvious to one of ordinary skill in the art to use Moseley with Gelsey. The motivation of claim 1 is incorporated herein.

Regarding Claims 20 and 21.

Gelsey does not explicitly disclose the claimed features.

Moseley teaches the claimed: wherein the altered 3-D scene point is altered to account for the relative difference in position between two 3-D pixels *(in figure 15a where the emitted and transmitted light from the 3-D pixels in the display 1 produce 3-D scene points, shown as rays, that are altered in slightly difference positions to account from relative differences between two adjacent 3-D pixels in display 1)* and wherein the act of calculating is performed without a use of global position information *(in figures 19 and 20 where the calculation is performed using the sequential data from gate lines 40 not global position information; i.e. one 3-D pixel is calculated based upon a previous 3-D pixel along gate line 40; also see col 3, lines 19-20).*

As per claims 20 and 21, it would have been obvious to one of ordinary skill in the art to use Moseley with Gelsey. The motivation of claim 1 is incorporated herein.

Claims 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gelsey (US Pat. No. 6,344,837). in view of Moseley et al. (US Patent 5,953,148) in further view of Norman (US Pat. No. 6,154,855).

Regarding Claim 11.

The reasons and rationale for the rejection of claim 1 is incorporated herein.

Gelsey does not explicitly disclose: said 3-D pixels comprise an input port and an output port for receiving and putting out 3-D scene points of a 3-D scene. However, the combination of Norman and Gelsey teaches such an arrangement *(Norman: col. 32 lines 13-20, also see figure 1D where the cells in grid each represent a pixel, and each cell has their own input and output ports, i.e. cell S has output to cell A and cell A can input from cell S; Gelsey also provides part of the claimed feature by teaching of 3-D pixels that each make up a cell, i.e. see figure 7 where the cube represents one 3D pixel).*

It would have been obvious to persons having ordinary skill in the art at the time of invention to modify the 3-D pixel of Gelsey to incorporate an input and an output port as in Norman. It was known that having cells equipped with direct input and direct output means allows the array to handle input intensive tasks without encountering an input bottleneck (See e.g. Norman col. 32 lines 22-25.)

Gelsey is modified by Norman by incorporating one cell in the array of local processors of Norman into each 3-D pixel in Gelsey to perform calculations rather than at their central processor. Gelsey can be modified according to the following passages in the reference: *(Gelsey: col 5, lines 39-43, "The modulation of each of the modulation regions 16 is controlled*

by an appropriate control system such as one or more computer processors in conjunction with suitable interface circuitry" and Gelsey: col 4, lines 31-35, "As shown in the latter, the DMPs 14 are configured in rows and columns with minimum spacing therebetween. Note also that the electronic circuitry for controlling the modulation of the DMPs 14 is also contained within the IDD 12"). In this case, Gelsey states that more than one processor may be used with the system. Norman provides an array of processors. In addition, Gelsey states that electronic circuitry for each DMP (directionally modulated pixel or 3-D pixel) is already present in the IDD (image display device). Thus, since some of the circuitry is already present this would make it easier to modify Gelsey to incorporate the array of processors as disclosed by Norman because each processor would need to communicate with the pixel by way of circuitry.

Regarding Claim 12

As per claim 12, this claim is similar in scope to claims 3 and 7, and thus is rejected under the same rationale.

Regarding Claim 13.

Gelsey teaches the 3-D display device according to claim 11, wherein the 3-D pixels comprise a spatial light modulator with a matrix of 2-D pixels. *(See e.g. Gelsey Fig. 5, in particular, the numerous modulation regions 16; in this case the modulation regions 16 are the claimed matrix of 2-D pixels and the claimed 3-D pixel is the directionally modulated pixel 14).*

Regarding Claim 14.

Gelsey teaches the 3-D display device according to claim 13, wherein the 3-D pixels comprise a point light source, providing the 2-D pixel with light *(See e.g. Gelsey 3-D display 26 in figure 8; also see figure 7 which shows a 3-D pixel 14 with a point source of light 15, the 2D pixels are shown as rectangular or square modulation regions 24).*

Regarding Claim 15.

Gelsey does not explicitly disclose the 3-D display device according to claim 13, wherein the 3-D pixels comprise registers for storing a value determining which ones of the 2-D pixels within said 3-D pixel contribute light to a 3-D scene point.

However, Norman teaches the use of arrays of processors where each processor has its own memory (See e.g. Norman Fig. 10 block 1016 where this memory is a plurality of registers, see also col. 2 lines 30-34.)

It would have been obvious to persons having ordinary skill in the art at the time of invention to modify the value determination of pixel contribution of light to a 3-D scene point as in Gelsey to incorporate storage registers as taught by Norman. It was known that systems comprising arrays of processors where each processor has its own memory can have the advantage of removing the von Neumann uni-processor bottleneck and the multi-processor memory bottleneck for parallel applications (See e.g. Norman col. 2 lines 34-36).

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gelsey (US Pat. No. 6,344,837) in view of Moseley et al. (US Patent 5,953,148) in further view of Seitz, et al. (US Pat. No. 6,363,170).

Regarding Claim 16.

Gelsey does not explicitly disclose the method of claim 1, wherein the calculating of the contribution comprises calculating whether a current 3-D scene point is closer to a viewer than a past 3-D scene point.

However, See e.g. Seitz, et al. col. 6 line 66 - col. 7, line 7. Here, voxel processing involves 1-bit Z-buffering, or occlusion detection which determines whether the current scene pixel is closer to a viewer than the previous 3-D scene point.

It would have been obvious for persons having ordinary skill in the art to modify the contribution calculation of Gelsey to determine relative depth of a scene point as taught by Seitz et al. It was known that use of depth testing can have the advantages of reducing required processing and preventing display of hidden surfaces.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gelsey (US Pat. No. 6,344,837) in view of Moseley et al. (US Patent 5,953,148) in further view of Norman (US Pat. No. 6,154,855) in further view of Seitz, et al. (US Pat. No. 6,363,170).

Regarding Claim 17.

Gelsey does not explicitly disclose the 3-D display device of claim 11, wherein the control unit calculates whether a current 3-D scene point is closer to a viewer than a past 3-D scene point.

However, See e.g. Seitz, et al. col. 6 line 66 - col. 7, line 7. Here, voxel processing involves 1-bit Z-buffering, or occlusion detection which determines whether the current scene pixel is closer to a viewer than the previous 3-D scene point.

It would have been obvious for persons having ordinary skill in the art to modify the contribution calculation of Gelsey to determine relative depth of a scene point as taught by Seitz et al. It was known that use of depth testing can have the advantages of reducing required processing and preventing display of hidden surfaces.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection. In particular, the new reference of Mosley is relied upon for teaching the new and amended features of the claims. Mosley in its own right can produce an autostereoscopic display, and thus is applicable to the claimed 3-D scene points using 3-D pixels.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL F. HAJNIK whose telephone number is (571)272-7642. The examiner can normally be reached on Mon-Fri (8:30A-5:00P).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel F Hajnik/
Examiner, Art Unit 2628

/Ulka Chauhan/
Supervisory Patent Examiner, Art Unit 2628